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employment. He suggests that in the higher schools one hour a week be given to ethnographic lectures, and that in university courses a double line of instruction be followed, one adapted to all students, setting forth the general principles and aims of the science, another suited to those who would take it as a major or make it a specialty. This plan would, he believes, soon result in that general appreciation of its value which the true ethnologist now claims for it.

D. G. BRINTON.
UNIVERSITY OF PENNSYLVANIA.

SCIENTIFIC NOTES AND NEWS.

THE SCIENTIFIC EXPERT.

UNDER the title 'The Imperiled Dignity of Science and the Law,' Prof. John Trowbridge contributes to the October number of *The Atlantic Monthly* an account of the difficulties of the expert witness before legislative committees and courts of justice. Scientific questions are usually too complex to be answered by 'yes' or 'no,' and the man of science is apt to become a partisan in the hands of the counsel who employs him, and then in turn to be discredited by the opposing counsel. There is often room for difference of opinion in regard to scientific questions that must be settled by legislatures and courts, but it is unfortunate for science and justice when experts can be found who will testify for money on the side for which they are paid As Prof. Trowbridge writes:

"The Judge, after hearing the arguments of the learned counsel, is left alone with the voluminous affidavits in which the scientific statements have been pared thin by the lawyers to enable one with no scientific training to see through them. One expert is balanced against another, and the Court is plunged into a state of great perplexity. What wonder that, in a recent case, a Judge remarked that one side having brought forward four experts and the other side five, and the learned professors on one side having testified in direct opposition to those on the opposing side, he would give a verdict to the side which brought the greater number of experts; and he therefore ordered an injunction to be issued in favor of the latter."

If the man of science is to be paid at all for expert opinion, it seems evident that he should be employed as a judge and not as an advocate. Prof. Trowbridge concludes:

"The most practical remedy, it seems to me, for the existing evils of expert testimony, would consist in making it customary for a Judge to call to his assistance any professor of science of high attainment who is not engaged by either of the parties in dispute. If the Judge appealed to the State to provide him with scientific advice, and if men eminent in science were selected by the State to aid the Judge in his endeavor to arrive at the truth on scientific points, both the bench and the professional chairs would gain in dignity, and the pursuit of truth would again be considered one of the chief characteristics of a scientific life."

THE U. S. S. 'BROOKLYN.'

THE performance of the U. S. S. 'Brooklyn,' on her recent trial trip, August 27th, admirably illustrates the high state of efficiency attained by our new navy, and, perhaps, even more satisfactorily, that reached by our naval constructors and engineers. The trial was made in deep water, outside Boston harbor, on a course eighty-three miles long, and well out at sea. It is only in water fifteen or twenty fathoms deep that the full sea speed of these heavy and fast vessels can be brought out.

The 'Brooklyn' is a ship of about 9,200 tons displacement—8,250 tons without armament or stores, as on the trial—and was designed, as to hull, by the Bureau of Construction of the Navy Department at Washington, and, as to machinery, by the Bureau of Steam Engineering, of which Commodore Melville, the famous Arctic explorer and no less distinguished naval engineer, is chief. On the trial so perfectly were the engines and boilers proportioned to each other that all the steam that could be made by the latter was worked off by the former, and enough was made at a pressure of 160 pounds per square-inch to drive the engine up to 135 revolutions per minute and to give the ship the unexampled mean speed of 21.92 knots —equivalent to over 25 miles an hour. This is claimed to be the highest speed ever attained by any iron-clad, of any type. It is only exceeded by some unarmored ships of our own navy, as the 'Columbia' and the 'Minneapolis,' and by no other war vessels of any navy in the world.

The 'Brooklyn' is 400 feet long, 64¾ feet beam, with a load draught of 24 feet. Her load displacement is computed at 9,153 tons and her engines are rated at 16,000 I. H. P. The contract speed was 20 knots at a displacement of 8,250 tons; but, as in the majority of later constructions, especially by the Cramps, the builders of the 'Brooklyn,' this speed is greatly exceeded on trial, and will undoubtedly even be somewhat exceeded when in sea-going trim. The contractors will make a bonus of $350,000 to $400,000 on the excess of trial speed over the minimum of the contract. This ship is considered unrivalled in conjoined power and speed.

The proposed armament consists in its principal battery, of eight 8-inch B. L. rifles with twelve 5-inch and some smaller ordnance. The armor is light—8-inch. This ship is a thousand tons heavier than the 'New York' and designed for one knot less speed; but she will probably fully equal that ship in this respect. The battery of the 'Brooklyn' is heavier, by two 8-inch and also by carrying 5-inch guns in place of 4-inch.

This is one of the most marvellous of all the examples of modern naval construction yet produced, all things considered, and its concentration of speed with offensive and defensive power is probably without equal. Perhaps we may also conclude that the performance of the 'Brooklyn' affords the best possible evidence of the wisdom of the policy of the creators of modern navies, and particularly of that of the United States, in securing that union of mathematical and scientific professional training with practical experience in the management of these intricate machines at sea which has placed our own engineer and construction corps on so high a plane and has given them the needed theoretical and practical ability to design such marvels of naval architecture as are the floating machines of which we now see our navy composed.

R. H. Thurston.

CHEMISTRY.

It is well known that all atomic weight determinations of tellurium have given results higher than would justify the place it holds in the periodic system, and have led to the supposition that some impurity of higher atomic weight may be present. Brauner's determinations give the figures 127.64; Staudenmaier using different methods has recently confirmed this, his number being 127.6. Acting upon the idea that both of these results were obtained on tellurium from the same or similar sources, Chikashigé has made determinations of a Japanese tellurium which occurs in a massive sulfur, uncontaminated with any of the heavy metals. The method he used is the same as that used by Brauner. The atomic weight found is 127.61 as a mean of three closely concordant experiments, and confirms the previous results. The anomaly of tellurium, as well as that of cobalt in the periodic system, thus remains as unexplained as before.

In a recent Journal of the Chemical Society Herbert McLeod published further investigations on the liberation of chlorin in the making of oxygen from potassium chlorate and manganese dioxid. In opposition to the work of Dr. Brunck, he shows clearly that the active gas liberated is chlorin and that no ozone is evolved. The reaction taking place is probably

$$2MnO_2+2KClO_3=2KMnO_4+Cl_2+O$$
$$2KMnO_4=K_2MnO_4+MnO_2+O_2$$
$$K_2MnO_4+Cl_2=2KCl+MnO_2+O_2$$

The manganese dioxid is continuously reproduced, and only a very small quantity of chlorin ultimately escapes absorption by the manganate.

J. L. H.

GENERAL.

Among the public lectures to be given in connection with the sesquicentennial celebration of the founding of the College of New Jersey and the ceremonies inaugurating Princeton University will be four lectures by Prof. J. J. Thomson on 'The Discharge of Electricity in Gases,' on October 13th, 14th, 15th and 16th; four lectures by Prof. Felix Klein on 'The Mathematical Theory of the Top,' October 12th, 13th and 15th, and one lecture by Prof. A. A. W. Hubrecht on 'The Descent of the Primates,' on October 19th. Men of science in departments of study represented by the lectures are invited to attend, but should make application for tickets before October 5th to Prof. William Libbey.

Nature states that Dr. W. R. Gowers will de-

liver the Bradshaw Lecture at the Royal College of Physicians on November 5th. The title of the lecture will be 'Subjective Sensations of Sound.' The Lumleian lecturer for next year is to be Dr. Bastian, and Dr. Luff will be the Gulstonian lecturer. Prof. Sidney Martin is to deliver the Croonian Lecture in 1898.

THE lecturers before the Peabody Institute, of Baltimore, will include the following: Professors Young, of Princeton; Hale, of Kenwood Observatory, in the University of Chicago; Keeler, of the Allegheny Observatory; Michaelson, of the University of Chicago; Trowbridge, of Harvard University, and Rowland and Ames, of the Johns Hopkins University.

THE Sanitary Institute of Great Britain held its Congress at Newcastle on Tyne, during the week beginning September 2d. The Congress was opened by the Duke of Cambridge, President of the Institute, and an inaugural address was made by Earl Percy, President of the Congress. Addresses were made before the Section of Sanitary Science and Preventive Medicine by Professor Corfield; before the Section of Chemistry, Meteorology and Geology by Mr. W. H. Dives; before the Section of Engineering and Architecture by Sir Andrew Noble, and a large number of papers were presented.

THE eighteenth general conference of the American Library Association, held recently at Cleveland, was attended by 600 members. An address was made by the President, Mr. G. Dana, of the Denver Public Library, and a large number of papers were read during the four days the Association was in session.

PROF. MICHAEL FOSTER will give at St. Bartholomew's Hospital on October 5th the first Huxley lecture, his subject being 'Recent Advances in Science and their Bearing in Medicine and Surgery.'

PROF. LEBER, editor of Graefe's Archiv für Ophthalmologie, was presented with the Graefe medal at the recent German Ophthalmological Congress in Heidelberg.

DR. FORSYTH MAJOR, who for over two years has been engaged in an examination of the fossil and recent flora and fauna of Madagascar, has recently returned to London. The expedition was supported by the Royal Society and the British Museum, and the collections have been deposited in the British Museum. The French government are preparing a still more elaborate expedition to Madagascar under the direction of M. Milne Edwards and M. Grandidier. It is said that 600,000 fr. will be spent on this expedition.

IT is stated that of the six steamers with which Captain Wiggins sailed on the 18th of August from Glasgow, four—namely the Glenmore, Scotia, Dauphin, and Father John of Kronstadt—will remain for service on the rivers and lakes of Siberia. Although his flotilla was late in sailing, it is hoped that he will reach Yenisseisk, or at least Krasnoyarsk, before the season of extreme cold commences.

IT is stated in the daily papers that a test of Octave Chanute's Albatross flying machine, invented and constructed by William Paul, was made at Millers, Indiana, on September 18th, and that though the flight was less than a hundred feet the machine acted in a satisfactory manner.

WE learn from the *British Medical Journal* that the arrangements preliminary to the founding of a Pasteur Institute for India were discussed at a recent meeting in Simla, when Surgeon-Major-General Gore, Principal Medical Officer of Her Majesty's Forces, the Quartermaster-General, the Surgeon-General with the Government of India and Professor Haffkine were present. It is proposed that the Institute should be erected in Kasauli or Darjeeling, and be a general institute, and not one for antirabic work only.

THE two following items are taken from the last issue of *Nature*: "A block of granite bearing the following inscription has, says the *Academy*, been recently placed on the southern shore of the Lake of Sils, in the Engadine: 'In memory of the illustrious English writer and naturalist, Thomas Henry Huxley, who spent many summers at the Kursaal Hotel, Majola.'"

"It is announced that the Royal Society of Canada has resolved to commemorate the five-hundredth anniversary of the first landing of Cabot in North America by holding a meeting at Halifax from June 30th to 26th of next year, and to erect, at a cost of not less than £200, a monument at Sydney, in Cape Breton."

We record with much regret the death of William Crawford Winlock, assistant in charge of the office of the Smithsonian Institution. He died at Bay Head, N. J., on September 20th, at the age of thirty-seven years. Mr. Winlock was the son of the eminent astronomer, Joseph Winlock, and had himself made valuable contributions to astronomy while occupied with executive work of much importance for the advancement of science.

Mr. Enoch Pratt, who endowed a free library in Baltimore with over $1,000,000, and had given other sums for educational and philanthropic purposes, died at Baltimore on December 17th, at the age of eighty-eight years.

M. Henri Resal died at Annemasse, Haute-Savoie, on August 22d, at the age of sixty-eight years. M. Resal was the author of many works on mining engineering, a member of the Paris Academy of Sciences and editor of the *Journal des mathématiques pures et appliquées.*

The Marine Biological Association, at Plymouth, England, is about to publish, through Macmillan & Co., a book on the natural history of commercially valuable sea fishes, entitled 'The Marketable Marine Fishes of the British Islands.' The work, which is now in press, has been prepared by Mr. J. T. Cunningham, with the assistance of Prof. E. Ray Lankester and the Council of the Association.

Mr. R. Ellsworth Call has in preparation a work on the Mammoth Cave of Kentucky which will be in large quarto with about 30 plates. The edition is limited to 200 copies, and will be sold only by subscription, which should be sent to the author, care of John P. Morton & Co., publishers, Louisville, Ky.

Messrs. D. Appleton & Co. make the following additional announcements: *Dynamic Sociology*, by Lester F. Ward; *Pioneers of Science in America*, edited by Dr. W. J. Youmans; *The Evolution of the Art of Music*, by C. Hubert H. Parry, new volumes in the International Scientific Series; *Our Juvenile Offenders*, by W. Douglas Morrison, a new volume in the Criminology Series; *Genius and Degeneration*, by Dr. William Hirsch.

A severe earthquake occurred in Iceland on August 26th and 27th, causing the destruction of many buildings.

Dr. Max Wolf discovered, at Heidelberg, on the evening of September 7th, four new minor planets; he had discovered one on September 3d, and their number now amounts to about 420.

Mr. Max Osterberg, of Columbia University, will give a lecture on the possibilities and limitations of the Röntgen Rays in Association Hall, New York, on the evening of September 25th. The proceeds will be devoted to securing apparatus with which to illustrate the instruction in the class room of the Y. M. C. A.

According to *Electricity*, in twenty-five years the total number of United States patents rose from 98,460 to 568,619. Of the latter number, electric generators claim 3,117; electric railways, 2,019; electric lighting, 3,622; electric power, 1,183; telegraphy, 3,205, and telephony, 2,459.

The Railway Gazette quotes, from the Bulletin of the Society of Engineers of France, experiments made on the use of pneumatic tires; the results obtained showed that with an empty carriage moving at a walk through the snow the draft was 35.9 lbs with the iron wheel, and but 25.2 lbs. with the pneumatic tire. At a trot, with a load of 660 lbs., the pull was 68.6 lbs. and 39.5 lbs. respectively. In the mud, under the same condition of load and speed, the pulls were 35.2 and 50.7 lbs. for the iron wheel, and 23.1 and 31.2 lbs. for the pneumatic tire. The other tests consisted of pulls of varying speeds over macadam, paved and ordinary roads, and in every instance the pneumatic tire showed a saving in pulling power of from 30 to nearly 50 per cent.

The Japan Mail Steamship Company proposes to run a line of steamships between Japan and Seattle, Washington. The company is said to be very successful and already to own fifty steamships, while twelve new steamships will be constructed for oceanic service.

'The Lounger' writes in *The Critic:* "Display headlines give the London *Daily Mail* quite the air of an American newspaper * * * That the sensational aspect imparted by the glaring headlines does not always belie the text, is clearly shown in its cablegrams

from America. Under date of August 14th, for instance, its New York correspondent sent this dispatch:

"Still the heat continues, and the odor of the charnel house reigns over the city. From hundreds of decomposing human bodies, and from the rotting carcasses of horses there exhales a stench that is positively sickening. Added to this horror is an epidemic of rabies. Mad dogs are running about the streets, and already more than a score of children have been bitten. The mortality due to the heat yesterday totals up 85 persons."

UNIVERSITY AND EDUCATIONAL NEWS.

MRS. EDWARD ROBY, Mr. E. A. Shedd and Mr. C. B. Shedd have offered the University of Chicago a large tract of land around Wolf Lake and the channel connecting it with Lake Michigan, for the purpose of a lake biological station, and it is also understood that they will erect the buildings for the purpose if the offer is accepted. The gift is valued at $500,000.

THE Lewis Institute, the new Chicago school of technology, the foundation stone of which was laid two years ago, has now been dedicated. The late Allan G. Lewis left, in 1877, $500,000 for the purpose, which has now accumulated so as to make the value of the endowment $1,600,000.

THE Ohio State University is now erecting three new buildings, viz: Townshend Hall, for the accommodation of agriculture and agricultural chemistry, to cost $75,000; a Gymnasium and Armory, to cost $65,000; and one for physiology, zoology and entomology, to cost $35,000.

AT Amherst College Mr. F. B. Loomis has been appointed assistant in biology and Mr. E. S. Newton assistant in chemistry. At Lafayette College Mr. W. O. Pennell has been appointed instructor in mathematics and drawing; P. C. Nugent, instructor in civil engineering, and R. E. Dennis, instructor in chemistry. At Wellesley College, Miss A. M. Claypole has been appointed instructor in zoology, and Miss J. Evans instructor in botany; Miss M. E. Maltby will be acting professor of physics during the absence abroad of Miss S. F. Whitinghead, of the department.

DR. TSCHERMAK, of the Military Medical Academy of St. Petersburg, has been appointed full professor of comparative anatomy and embryology in the University of Dorpat. Dr. Lynen, of Charlottenberg, has been appointed professor of mechanical engineering in the Polytechnic Institute at Aachen.

DISCUSSION AND CORRESPONDENCE.

MR. LOWELL'S BOOK ON 'MARS.'

THE strong title, "The Lick Review of 'Mars'" which Mr. Douglass prefixes to his paper is a misnomer. The book was read, the review was written, the MS. was forwarded to the editor and put in type, wholly in the absence of those of my colleagues who were specially interested in Mars. The responsibility for every statement lies with me and is cheerfully accepted. Nor are any changes now required.

It is a matter of extreme regret to me that Mr. Douglass' comments on my review are so largely personal. I had hoped that one or more of the scientific questions involved might be discussed. My review covered a very limited number of the points which I had desired to bring up; at many points in Mr. Lowell's argument the connection of cause and effect is not clear; and the subject is important. I sincerely hope that Mr. Douglass will write anoanother paper and devote it to the scientific side of Mars.

I again wish to acknowledge my indebtedness for the quotations from one of Schiaparelli's papers translated at Flagstaff by Prof. W. H. Pickering, from which I quoted and to which I gave credit. But many of us had previously read Schiaparelli's *earlier* papers in *Himmel und Erde*, in Flammarion's *Mars* and in the transactions of the *Reale Accademia dei Lincei*, and had found them full of facts determined and theories faintly suggested to which the modern writer of a book on Mars could conscientiously give credit.

It is true, as Mr. Douglass suggests, that Schiaparelli claimed to have observed seasonal changes on Mars. It is also only too true that Mr. Lowell's book does not mention the eminent Italian's observations of such changes. For my pains in quoting Schiaparelli's own description of the seasonal changes observed by